PEACE/WILLISTON
FISH & WILDLIFE
COMPENSATION
PROGRAM

BCHydro

BRITISH
COLUMBIA

Peace/williston Fish and Wildlife Compensation Program Fish Program Operational Plan, 2001 – 2006

H. Andrusak and A. R. Langston
April 2000

PWFWCP Report No. 223

105-02363/

The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

Peace/Williston Fish and Wildlife Compensation Program, 1011 Fourth Ave. 3rd Floor, Prince George B.C. V2L 3H9

Website: *www.bchydro.bc.ca/environment/initiatives/pwcp/*

This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

Citation: H. Andrusak and A. R. Langston. April 2000. Peace/Williston Fish and Wildlife Compensation Program Fish Program Operational Plan, 2001 – 2006. Peace/Williston Fish and Wildlife Compensation Program, Report No. 223. 3pp plus appendices.

Author(s): Harvey Andrusak[1] and Arne Langston[2]
Address(es): [1] Redfish Consulting,
Site 11, Compartment 6, Nelson, B.C. V1L 5P6
[2] Peace/Williston Fish and Wildlife Compensation Program, 1011 Fourth Ave., 3rd Floor
Prince George, B.C. V2L 3H9

PEACE/WILLISTON FISH AND WILDLIFE COMPENSATION PROGRAM

FISH OPERATIONAL PLANS

2001-2006

INTRODUCTION

Formation of two reservoirs within the Peace River watershed has resulted in significant changes to the aquatic ecosystem that present fisheries workers with some very real challenges. The most dramatic change is a substantial loss of riverine habitat and creation of two reservoirs that operate very differently. The Williston Reservoir is regulated as a storage reservoir with a large annual drawdown for flood control and power generation. The Dinosaur Reservoir is operated as a "run-of-the-river" reservoir for power generation with little drawdown but high flushing rate.

Understanding how fish adapt to new environments associated with hydroelectric development (reservoirs and greatly reduced riverine habitat) involves a long-term, major undertaking. The long-term view was recognized and accepted from the onset of the PWFWCP by both BC Hydro and the Ministry of Environment, Lands and Parks.

In the initial years, the Program focussed on implementing some remedial measures since fish compensation is the primary objective, as reflected in the Program's strategic plan. Much of this work involved fish habitat improvement, fish stocking and evaluation of fish enhancement opportunities outside of the reservoir(s) area. Balancing the imperative to compensate or enhance fish and fish habitat with the need for baseline fisheries information has been difficult at times but a reasonable combination of both types of projects has been achieved to date. The vast majority of projects to date have been on rivers, lakes and streams with considerably less effort directed towards the reservoirs themselves. As the Program moves into the 21st century, there is a growing recognition that more fisheries work must be directed towards understanding the dynamics of the fish community in the reservoirs. The potential of the Williston Reservoir to support sustainable sport fisheries can only be achieved if the appropriate information is collected and sound decisions are made based on credible scientific practices.

To assist in management of fish populations and development of mitigation strategies, the Program needs some basic information on fish biology. For most of the 24 species known to exist in the watershed, there is limited information on basic biological parameters, such as distribution, age, fecundity, and length-at-age. The reservoirs have not been surveyed for basic physical, chemical, and biological parameters to understand the ecological relationships that now exist and what fish species are most likely to persist over the long-term. The watershed-specific relationship(s) between species are poorly understood, nor is it clear what species are prey and what species are predators. Despite this general lack of information, some compensation projects directly associated with the reservoir(s) have been undertaken and some successes are evident. A

conscious effort has been made to include some restoration or enhancement work each year (e.g., experimental stream fertilization, community enhancement projects) and this can continue but reservoir and specific watershed baseline data is woefully inadequate to undertake large-scale enhancements.

Some fundamental concerns of fisheries workers center around what fish species exist today and how are they adapting to the new ecosystems. It can be argued from a pragmatic point of view that there is little point in spending a great deal of time on a species that cannot adapt to a changed environment. On the other hand, there is a scientific, ethical, and regulatory responsibility to ensure that species do not go extinct. These kinds of concerns are reflected in the priority issues outlined in the operational plans.

The Program, management agencies, and other watershed users must also be mindful of long-term issues such as global warming and water quality. These issues could have major impacts on fish in the watershed and the Program must be able to at least understand and track any changes in order to make adjustments to the Program's future strategic direction.

Public communication, consultation and education are an on-going concern for the Program. Keeping the public (and private sector) informed of Program activities is critical and requires a considerable amount of staff time. Further, it is critically important that the fish program seek input from the public to ensure effective delivery. Additionally, the Program has a responsibility to organize and share the information obtained with various professional staff.

The PWFWCP-Fish Technical Committee has recognized that with limited resources and an overwhelmingly large study area some planning and prioritization of work is essential. Annual budgets require planning and priority setting but the "bigger picture" long-term view has not always been incorporated into this planning process.

Future emphasis will be focused on the long-term view, however high priority will continue to be placed on implementation of enhancement opportunities as they are identified.

STRATEGIC AND OPERATIONAL PLANS

The PWFWCP Fish Technical Committee developed a Strategic Plan in early 1999, which provides a planning framework for development of an operational plan. An operational plan describes how, when, and where a particular strategic objective is to be achieved. Some operational plans may be only one year in duration but most will reflect multi-year projects with some exceeding the five-year time frame of the strategic plan. An operational plan usually consists of several "tasks" that can be identified as budget items. These plans will often support more than one strategic objective and they are usually developed because of specific issues of concern to the Program. The PWFWCP Fish Technical Committee used the "core issues" to develop the operational plans.

The **core issues** identified by the Fish Technical Committee include:

1. Understand Species Assemblage and Maintenance of Biodiversity in Watershed.
2. Reservoir Productivity Status.
3. Establish Watershed Specific Species Plans.
4. Development of Databases and Information Sharing.
5. Inform and Educate the Public About Fish and the Environment.
6. Monitor Angler Use and Catch.
7. Global Warming.
8. Water Quality.

Appendix 1 provides a description of each issue and a brief description of the primary concerns.

OPERATIONAL PLANNING AND BUDGET PROCESSES

The Fish Technical Committee used the core issues to identify key concerns. Each issue is linked to the Strategic Plan objectives and strategies and a list of tasks required to address each issue has been developed (Appendix 1). As a group the committee ranked the tasks as high, medium and low priority in recognition that not all the tasks can possibly be accomplished at once. Only the high priority tasks were considered for development of the 2001-2006 operational plan. These high priority tasks were then prioritized by each of the committee members and the final list (Appendix 2) will be used for budget development commencing in 2001-2002. The operational plan over a five year time frame is summarized in Appendix 3.

It is highly desirable to develop operational plans that are linked and can be inserted directly into the annual budget planning process. The PWFWCP used six broad budget categories coded in the tasks as follows:

- I = Inventory/Research
- A = Administration
- En = Enhancement
- Ev = Evaluation
- Pl = Planning
- Pc = Public Consultation

The common denominator between the two processes is at the "activity-task" level. An activity may be one or several "tasks". Operational plans are cross-referenced at the task level with the budget process.

APPENDIX 1

(Core issues)

Core Issues

The issues facing the Program in attempting to accomplish its goal are numerous and complex. Those issues that are currently of considerable concern to the Program, not in any order of priority, include:

1. Species assemblage and maintenance of species diversity:
    - reflects the need to understand what fish species exist and their relative abundance;
    - reflects the ethical and scientific responsibility to retain biodiversity;
    - reflects the need to understand what species may be at risk;
    - acknowledgement of loss of so much riverine habitat thus placing greater importance on remaining river habitat and fish species.
2. Reservoir productivity and oligotrophication:
    - reflects the knowledge of gradual reduction in productivity and fish yield of the reservoirs until a new equilibrium is reached.
    - reflects the need to better understand the changes occurring within the reservoirs.
3. Lack of watershed specific species plans:
    - lack of prioritized plans for better understanding fish species biology;
    - the need to develop and coordinate Program plans with other agency land use plans.
4. Need for database development:
    - reflects need to contribute to other databases;
    - reflects need to share data with Peace/Williston Partners, other agencies and institutions.
5. Inform and educate the public:
    - reflects the understanding of importance of informing and educating the public.
6. Angler use:
    - reflects the need to monitor angler use and catch particularly in the reservoirs.
7. Global warming:
    - subtle impacts over time to fish and fish habitat due to global warming such as changes to water temperature, snow pack and timing of rainfall (hence runoff).
8. Water quality:
    - acknowledgement of possible impact that mercury accumulations may have on fish biology and the need to obtain fish samples over time for monitoring purposes;
    - impacts of heavy metals on fish;
    - impacts of sedimentation on fish life.

1. ISSUE: SPECIES ASSEMBLAGE AND MAINTENANCE OF SPECIES DIVERSITY

CONCERNS:

- identification of species present;
- maintenance of existing, indigenous species;
- understanding species interdependence and interactions;
- understanding species responses to changing ecological conditions of the reservoir and significantly reduced riverine habitat;
- understanding species sustainability over time;
- identifying species at risk.

Strategic Objective # 1: Contribute to the management of fish and their habitat.

- conduct population assessments;
- provide information for the protection of habitat;
- undertake experimental research.

Strategic Objective # 2: Develop a greater understanding of aquatic ecosystems in northern reservoirs.

- implement a systematic coordinated approach to inventory and assessment of fish and fish habitat;
- develop opportunities for information exchange;
- develop and implement recommendations for maintaining/enhancing populations.

Strategic Objective # 3: Promote public awareness, appreciation and understanding of northern aquatic habitats.

- inform and educate the public.

1.0 Species Assemblage and Maintenance of Species Diversity Plan

	TASKS	BUDGET CODE	ACTIVITIES/ REQUIREMENTS	STATUS	PRIORITY
1.1	Develop list of species.	I	Confirm fish species in watershed.	Completed	H
1.2	Develop fish distribution maps for selected species.	I	Produce species specific distribution maps utilizing existing information (FISS, DFO, and MELP).	Required	H
1.3	Identify species and their relative abundance in the watershed.	I	Assess relative trends in abundance of reservoir and non-reservoir species using standardized techniques (hydro acoustics, trawl, gill net, electroshocking, and creel census) at established index sites.	Required In progress	H
1.4	Understand species interactions.	I	Examine food habits of priority fish species that utilize different trophic levels in key water bodies.	Required	
1.5	Identify species at risk.	I	Develop specific inventories of fish species considered rare, at risk.	Completed	H
1.6	Produce brochure (s).	[illegible]	Create brochures for public on rare or endangered species.	Required	H

2. ISSUE: RESERVOIR PRODUCTIVITY

CONCERNS:

- aging of newly formed reservoir results in gradual decline in productivity;
- lack of background, baseline data (physical, chemical and biological); and
- species assemblage changing in response to reservoir formation and aging.

Strategic Objective # 1: Contribute to the management of fish and their habitat.

- conduct population assessments;
- undertake experimental research.

Strategic Objective # 2: Develop a greater understanding of aquatic ecosystems in northern reservoirs.

- implement a systematic coordinated approach to inventory and assessment of fish and fish habitat.

2.0 Reservoir Productivity Plan

	TASKS	BUDGET CODE	ACTIVITIES/ REQUIREMENTS	STATUS	PRIORITY
2.1	Review/summarize existing data.	PI	Review existing data on watershed.	Completed	H
	Conduct data gap analysis.	PI	Identify key data requirements.	Completed	H
2.2	Review/analyze kokanee model for data needs.	PI	C. Walters to review key data needs.	Required	H
2.3	Develop and implement appropriate limnological data collection program.	I	a) Establish short-term limnological sampling program (physical, chemical and biological).	Completed	H
		I	b) Establish long-term monitoring limnological program based on short-term results.	In progress Due 00/01	H
		I	c) Conduct limnological data collection on Williston Reservoir.	Required	H
2.4	Interpret limnological data to determine reservoir carrying capacity.	PI	Review and model limnological data. Develop/apply existing models to determine fish carrying capacity.	In progress	H H
2.5	Develop and implement appropriate fish data collection program.	I	a) Employ hydro acoustics, trawling and gill netting.	In progress	H
		I	b) Establish long-term fish monitoring program based on short-term results.	Required	H
2.6	Develop reservoir action plan.	PI	Synthesize all information into reservoir action plan(s).	required	H

3. ISSUE: WATERSHED SPECIFIC SPECIES PLANS

Arctic Grayling

CONCERNS:

- insufficient data on this species within watershed;
- distribution within watershed unknown;
- uncertainty regarding number of stocks and their status;
- migration behavior not understood;
- interaction(s) and importance to other species unknown.

Strategic Objective # 1: Contribute to the management of fish and their habitat.

- conduct population assessments;
- undertake habitat improvement activities;
- provide information for the protection of habitat;
- undertake experimental research.

Strategic Objective # 2: Develop a greater understanding of aquatic ecosystems in northern reservoirs.

- implement a systematic coordinated approach to inventory and assessment of fish and fish habitat.

Strategic Objective # 3: Provide for a variety of angling opportunities.

- provide recreational fishing opportunities where appropriate.

Strategic Objective # 4: Promote public awareness, appreciation and understanding of northern aquatic habitats.

- educate the public;
- information exchange;
- provide opportunities for appreciative use of fish.

3.1 Arctic Grayling Plan

	TASKS	BUDGET CODE	ACTIVITIES/ REQUIREMENTS	STATUS	PRIORITY
3.1.1	Distribution map.	Pl	Develop distribution map.	Completed	H
		Pc	Provide map to agencies.	Required	
3.1.2	Review of life history.	Pl	Northcote review.	Completed/ In progress	H
3.1.3	Data gap analysis.	Pl	Identify data requirements.	Required In progress	H
3.1.4	Basic biology data collection.	I	Sample for length, length-at-age, fecundity.	Completed (except fecundity)	
		I	DNA for specific stocks (Stanford work) using existing data where appropriate.		
3.1.5	Distribution and status.	I	Identify life history strategies by habitat type.	Required	
		I	Document river spawning and rearing habitat requirements.		
3.1.6	Understand species interactions.	I	Examine food habits that utilize different trophic levels.	Required	
3.1.7	Grayling workshop.	Pc	Conduct workshop.	Completed	H
3.1.8	Restore grayling.	En & Ev	Experimental fertilization of candidate rivers.	On-going	H
		Ev	Determine why stocks disappeared.		
3.1.9	Restore grayling.	Ev	Evaluate genetic reserve pool (Little Calais Lake).	Completed	H
3.1.10	Develop management recovery plan.	Pl	First draft completed; revise.	Required	H

3. ISSUE: WATERSHED SPECIFIC SPECIES PLANS

Kokanee

CONCERNS:

- some knowledge and data on this species but unclear of status of wild vs hatchery stocks;
- distribution within reservoir and spawning in streams is not well understood;
- interaction(s) and importance to other species unknown; no data to indicate if this species is utilized as forage by predaceous species;
- has stocking to date been successful?;
- how does reservoir productivity limit kokanee production?

Strategic Objective # 1: Contribute to the management of fish and their habitat.

- conduct population assessments;
- provide information for the protection of habitat;
- undertake experimental research;
- undertake habitat improvement activities;
- review stocking strategy.

Strategic Objective # 2: Develop a greater understanding of aquatic ecosystems in northern reservoirs.

- implement a systematic coordinated approach to inventory and assessment of fish and fish habitat;
- develop opportunities for information exchange.

Strategic Objective # 3: Provide for a variety of angling opportunities.

- provide recreational fishing opportunities through stocking where appropriate.

Strategic Objective # 4: Promote public awareness, appreciation and understanding of northern aquatic habitats.

- educate the public;
- information exchange;
- provide opportunities for appreciative use of fish.

3.2 Kokanee Plan

	TASKS	BUDGET CODE	ACTIVITIES/ REQUIREMENTS	STATUS	PRIORITY
3.2.1	Distribution map.	Pl	Review existing data and literature to develop map.	Completed	H
3.2.2	Review/summarize existing data.	Pl	*See "2. Reservoir Productivity Issue".	Required	H
3.2.3	Data gap analysis.	Pl	Identify data requirements.	Required	
3.2.4	Basic biology data collection.	I	Sample for length, length-at-age, fecundity, DNA for specific stocks (Finlay, Parsnip, wild vs hatchery).	Required In progress	
3.2.5	Spawner distribution.	I	Establish index streams for aerial and ground monitoring.	Required	
3.2.6	Conduct hydro acoustic and trawl.	I	Establish index stations on reservoir and initiate program.	Required	
3.2.7	Utilize large lake model.	I	Review and update large lake model used elsewhere in BC.	Required	
3.2.8	Produce action plan.	Pl	Summarize all data into species action plan report.	Required	H
3.2.9	Kokanee stocking.	Ev	Reassess stocking strategy based on data collected.	Required	
3.2.10	Distribute report.	Pc	Provide information to agencies, public and ensure information exchange.	Required	

3. ISSUE: WATERSHED SPECIFIC SPECIES PLANS

Pygmy whitefish

CONCERNS:

- little knowledge or data on this species;
- distribution within watershed unknown;
- interaction(s) and importance to other species unknown.

Strategic Objective # 1: Contribute to the management of fish and their habitat.

- conduct population assessments;
- provide information for the protection of habitat.

Strategic Objective # 2: Develop a greater understanding of aquatic ecosystems in northern reservoirs.

- implement a systematic coordinated approach to inventory and assessment of fish and fish habitat.

Strategic Objective # 3: Promote public awareness, appreciation and understanding of northern aquatic habitats.

- educate the public;
- information exchange;
- provide opportunities for appreciative use of fish.

3.3 Pygmy Whitefish Plan

	TASKS	BUDGET CODE	ACTIVITIES/ REQUIREMENTS	STATUS	PRIORITY
3.3.1	Distribution map.	PI	Review literature and develop map.	Completed	H
3.3.2	Review life history information.	PI	Review literature.	Required	H
3.3.3	Data gap analysis.	PI	Identify data requirements.	Required	
3.3.4	Distribution and status.	I	Confirm in the field presence and distribution.	Required	H
3.3.5	Basic biology data collection.	I	Sample for length, length-at-age, fecundity and other required data.	Required	H
3.3.6	Produce action plan.	PI	Summarize all data into species action plan report.	Required	
3.3.7	Distribute report.	Pc	Provide information to agencies, public and ensure information exchange.	Required	

3. ISSUE: WATERSHED SPECIFIC SPECIES PLANS

Burbot

CONCERNS:

- little knowledge or data on this species in the watershed;
- distribution within watershed unknown;
- interaction (s) and importance to other species unknown.

Strategic Objective # 1: Contribute to the management of fish and their habitat.

- conduct population assessments;
- provide information for the protection of habitat.

Strategic Objective # 2: Develop a greater understanding of aquatic ecosystems in northern reservoirs.

- implement a systematic coordinated approach to inventory and assessment of fish and fish habitat.

Strategic Objective # 3: Promote public awareness, appreciation and understanding of northern aquatic habitats.

- educate the public;
- information exchange;
- provide opportunities for appreciative use of fish.

3.4 Burbot Plan

	TASKS	BUDGET CODE	ACTIVITIES/ REQUIREMENTS	STATUS	PRIORITY
3.4.1	Distribution map.	PI	Review literature and develop map.	Completed	H
3.4.2	Review life history information.	PI	Review literature.	Required	
3.4.3	Data gap analysis.	PI	Identify data requirements.	Required	
3.4.4	Distribution and status.	I	Confirm in the field presence and distribution.	Required	
3.4.5	Basic biology data collection.	I	Sample for length, length-at-age, fecundity and other required data.	Required	
3.4.6	Produce action plan.	PI	Summarize all data into species action plan report.	Required	
3.4.7	Distribute report.	Pc	Provide information to agencies, public and ensure information exchange.	Required	

3. ISSUE: WATERSHED SPECIFIC SPECIES PLANS

Bull trout

CONCERNS:

- little knowledge or data on this species;
- distribution within watershed unknown;
- interaction (s) and importance to other species unknown.

Strategic Objective # 1: Contribute to the management of fish and their habitat.

- conduct population assessments;
- undertake habitat improvement activities;
- provide information for the protection of habitat;
- undertake experimental research.

Strategic Objective # 2: Develop a greater understanding of aquatic ecosystems in northern reservoirs.

- implement a systematic coordinated approach to inventory and assessment of fish and fish habitat.

Strategic Objective # 4: Promote public awareness, appreciation and understanding of northern aquatic habitats.

- educate the public;
- information exchange;
- provide opportunities for appreciative use of fish.

3.5 Bull Trout Plan

	TASKS	BUDGET CODE	ACTIVITIES/REQUIREMENTS	STATUS	PRIORITY
3.5.1	Distribution map.	PI	Review literature, review existing maps, and update.	Completed	H
3.5.2	Data gap analysis.	PI	Identify data requirements.	Required	H
3.5.3	Determine specific habitat and attributes of bull trout.	I	Research Davis River bull trout water temperatures, habitat requirements and behavior.	On-going	H
3.5.4	Basic biology data collection.	I	Sample for length, length-at-age, fecundity, DNA for specific stocks.	Required	
3.5.5	Conduct experimental research.	I	Evaluate Gething/Mesilinka projects.	On-going	H
3.5.6	Distribution and status.	I	Confirm in the field presence and distribution of spawners.	Required	
3.5.7	Produce action plan.	PI	Summarize all data into species action plan report.	Required	H
3.5.8	Distribute report.	Pc	Provide information to agencies, public and ensure information exchange.	Required	

3. ISSUE: WATERSHED SPECIFIC SPECIES PLANS

Rainbow trout

CONCERNS:

- little knowledge or data on this species;
- distribution within watershed unknown;
- uncertainty regarding number of stocks and their status (wild vs introduced);
- interaction (s) and importance to other species unknown.

Strategic Objective # 1: Contribute to the management of fish and their habitat.

- conduct population assessments;
- undertake habitat improvement activities;
- provide information for the protection of habitat;
- undertake experimental research.

Strategic Objective # 2: Develop a greater understanding of aquatic ecosystems in northern reservoirs.

- implement a systematic coordinated approach to inventory and assessment of fish and fish habitat;

Strategic Objective # 3: Provide for a variety of angling opportunities.

- provide recreational fishing opportunities through stocking and habitat improvement where appropriate.

Strategic Objective # 4: Promote public awareness, appreciation and understanding of northern aquatic habitats.

- educate the public;
- information exchange;
- provide opportunities for appreciative use of fish.

3.6 Rainbow Trout Plan

	TASKS	BUDGET CODE	ACTIVITIES/REQUIREMENTS	STATUS	PRIORITY
3.6.1	Distribution map.	Pl	Review literature, review existing maps, and update.	Completed	H
3.6.2	Data gap analysis.	Pl	Identify data requirements.	Required	H
3.6.3	Basic biology data collection.	I	Sample for length, length-at-age, fecundity, DNA for specific stocks.	Required	
3.6.4	Distribution and status.	I	Identify life history strategies by habitat type (lakes, rivers, and reservoirs).	Required	
3.6.5	Evaluate food habits.	Ev	Evaluate reservoir utilization and species interactions.	Required	
3.6.6	Assess enhancement project.	En	Simpson Lake rainbow trout transplant/stocking assessment.	On-going	
3.6.7	Develop action plan.	Pl	Summarize all data into species action plan report.	Required	H
3.6.8	Assess annual stocking.	Ev & En	Annual stocking and assessment. Assess wild vs hatchery fish issue.	Required	H

3. ISSUE: WATERSHED SPECIFIC SPECIES PLANS

Dolly Varden

CONCERNS:

- little knowledge and no data on this species;
- distribution within watershed unknown;
- only recently realized species exists in watershed, therefore species of concern.

Strategic Objective # 1: Contribute to the management of fish and their habitat.

- conduct population assessments;
- provide information for the protection of habitat.

Strategic Objective # 2: Develop a greater understanding of aquatic ecosystems in northern reservoirs.

- implement a systematic coordinated approach to inventory and assessment of fish and fish habitat.

Strategic Objective # 3: Promote public awareness, appreciation and understanding of northern aquatic habitats.

- educate the public;
- information exchange;
- provide opportunities for appreciative use of fish.

3.7 Dolly Varden Plan

	TASKS	BUDGET CODE	ACTIVITIES/ REQUIREMENTS	STATUS	PRIORITY
3.7.1	Distribution map.	Pl	Review literature and develop map.	Required	H
3.7.2	Review life history information.	P	Review literature.	Required	
3.7.3	Data gap analysis.	Pl	Identify data requirements.	Required	
3.7.4	Distribution and status.	I	Confirm in the field presence and distribution.	Required	
3.7.5	Basic biology data collection.	I	Sample for length, length-at-age, fecundity and other required data.	Required	
3.7.6	Produce action plan.	Pl	Summarize all data into species action plan report.	Required	
3.7.7	Distribute report.	Pc	Provide information to agencies, public and ensure information exchange.	Required	

3. ISSUE: WATERSHED SPECIFIC SPECIES PLANS

Lake trout

CONCERNS:

- little knowledge or data on this species;
- distribution within watershed unknown;
- interaction(s) and importance to other species unknown.

Strategic Objective # 1: Contribute to the management of fish and their habitat.

- conduct population assessments;
- undertake habitat improvement activities;
- provide information for the protection of habitat;
- undertake experimental research.

Strategic Objective # 2: Develop a greater understanding of aquatic ecosystems in northern reservoirs.

- implement a systematic coordinated approach to inventory and assessment of fish and fish habitat.

Strategic Objective # 3: Promote public awareness, appreciation and understanding of northern aquatic habitats.

- educate the public;
- information exchange;
- provide opportunities for appreciative use of fish.

3.8 Lake Trout Plan

	TASKS	BUDGET CODE	ACTIVITIES/REQUIREMENTS	STATUS	PRIORITY
3.8.1	Distribution map.	PI	Review literature, review existing maps, and update.	Required In progress	H
3.8.2	Review existing data.	PI	Review and summarize literature, lake inventory and census data.	Required	H
3.8.3	Data gap analysis.	PI	Identify data requirements.	Required	H
3.8.4	Basic biology data collection.	I	Sample for length, length-at-age, fecundity, DNA for specific stocks.	Required	
3.8.5	Distribution and status.	I	Confirm in the field presence and distribution of spawners.	Required	
3.8.6	Determine specific habitat and attributes of lake trout.	I	Identify lake trout population habitat requirements and behavior.	On-going	
3.8.7	Produce action plan.	PI	Summarize all data into species action plan report.	Required	H
3.8.8	Distribute report.	Pc	Provide information to agencies, public and ensure information exchange.	Required	

3. ISSUE: WATERSHED SPECIFIC SPECIES PLANS

Brook trout

CONCERNS:

- impacts (interactions and genetic) on wild fish;
- insuring populations are contained within closed systems

Strategic Objective # 1: Contribute to the management of fish and their habitat.

- conduct population assessments;
- undertake habitat improvement activities if other species unaffected.

Strategic Objective # 2: Develop a greater understanding of aquatic ecosystems in northern reservoirs.

- assess small lake system(s) for distribution.

Strategic Objective # 3: Provide for a variety of angling opportunities.

- provide recreational fishing opportunities through stocking and habitat improvement where appropriate.

Strategic Objective # 4: Promote public awareness, appreciation and understanding of northern aquatic habitats.

- educate the public;
- information exchange.

3.9 Brook Trout Plan

	TASKS	BUDGET CODE	ACTIVITIES/REQUIREMENTS	STATUS	PRIORITY
3.9.1	Distribution map.	Pl	Review literature, review existing maps, and update.	Required	H
3.9.2	Assess stocking program.	Ev & En.	Annual stocking and assessment.	Required	H

3. ISSUE: WATERSHED SPECIFIC SPECIES PLANS

Lake whitefish

CONCERNS:

- little knowledge or data on this species;
- distribution within watershed unknown;
- interaction (s) and importance to other species unknown.

Strategic Objective # 1: Contribute to the management of fish and their habitat.

- conduct population assessments;
- provide information for the protection of habitat.

Strategic Objective # 2: Develop a greater understanding of aquatic ecosystems in northern reservoirs.

- implement a systematic coordinated approach to inventory and assessment of fish and fish habitat.

Strategic Objective # 3: Promote public awareness, appreciation and understanding of northern aquatic habitats.

- educate the public;
- information exchange;
- provide opportunities for appreciative use of fish.

3.10 Lake Whitefish Plan

	TASKS	BUDGET CODE	ACTIVITIES/REQUIREMENTS	STATUS	PRIORITY
3.10.1	Distribution map.	PI	Review literature and develop map.	Required	H
3.10.2	Review life history information.	PI	Review literature and write report.	Required	
3.10.3	Data gap analysis.	PI	Identify data requirements.	Required	
3.10.4	Distribution and status.	I	Confirm presence, distribution from hydro acoustics and trawl work.	Required	
3.10.5	Basic biology data collection.	I	Sample for length, length-at-age, fecundity and other required data.	Required	
3.10.6	Understand species interactions.	I	Sample potential predators for food habits and food habits of lake whitefish.	Required	
3.10.7	Document/confirm river spawning events.	I	Ground survey Ingenika/Parsnip rivers for possible spawning.	Required	
3.10.8	Produce action plan.	PI	Summarize all data into species action plan report.	Required	
3.10.9	Distribute report.	Pc	Provide information to agencies, public and ensure information exchange.	Required	

4. ISSUE: DEVELOP DATABASES AND INFORMATION SHARING

CONCERNS:

- available data and reports have not been identified;
- current limnological and biological data is not consolidated in any database(s);
- program information (data) needs to be accessible to other workers and public;
- ensure information is shared to avoid duplication.

Strategic Objective # 1: Develop a greater understanding of aquatic ecosystems in northern reservoirs.

- implement a systematic, coordinated approach to inventory and assessment of fish and fish habitat;
- develop opportunities for information exchange;
- provide information for entering into provincial fisheries data warehouse.

4.0 Develop Databases and Information Sharing Plan

	TASKS	BUDGET CODE	ACTIVITIES/ REQUIREMENTS	STATUS	PRIORITY
4.1	Review and summarize existing watershed data.	Pl	Produce report summarizing all available fish related reports within watershed.	Completed In progress	H
4.2	Assess fish database systems.	Pl	Develop database (compatible with Provincial database) for biological information queries and analysis.	Required	
4.3	Communicate and contribute data.	Pl	Provide data and or input into provincial fisheries database.	Required In progress	H
4.4	Communicate and contribute data.	Pc	Sharing reports with public by Program publications and the internet.	Required In progress	

5. ISSUE: INFORM AND EDUCATE THE PUBLIC ABOUT FISH AND THE ENVIRONMENT[1]

CONCERNS:

- information obtained by the Program on fish and their habitat is provided to the public and private sector in a timely manner;
- the public is educated on the biology of fish and natural (biological) limitations that may exist;
- scientific work conducted elsewhere is utilized by the Program;
- opportunities to appreciate fish are conveyed to the public.

Strategic Objective # 2: Develop a greater understanding of aquatic ecosystems in northern reservoirs.

- develop opportunities for information exchange.

Strategic Objective #4: Promote public awareness, appreciation and understanding of northern aquatic habitats.

- involve First nations, stakeholders and the public in program activities;
- educate the public;
- provide opportunities for appreciative use of fish.

5.0 Inform, Educate and Involve Public Plan

	TASKS	BUDGET CODE	ACTIVITIES/REQUIREMENTS	STATUS	PRIORITY
5.1	Produce educational materials.	Pc	Kokanee in the classroom program.	In progress	H
5.2	Produce fish brochures.	Pc	Develop fish identification brochure.	Completed	
5.3	Produce grayling video.	Pc	Develop technical presentation on grayling biology.	Decided not to do	
5.4	Sponsor grayling workshop.	Pc	Host grayling workshop in year 2000.	Completed	
5.5	Fact sheets.	Pc	Produce educational fact sheets.	On-going	H
5.6	Fish viewing.	Pc	Summarize in report form future fish viewing opportunities.	Required	
5.7	Information exchange.	Pc	Public lecture series @ UNBC.	Required	
5.8	Inform and educate public.	Pc	Attend stakeholder meetings. Provide information on fish program activities.	On-going	H

[1] Separate from Public Consultation Program.

6. ISSUE: MONITOR ANGLER USE AND CATCH

CONCERNS:

- where are people fishing;
- what are people fishing for;
- what do people want to fish for;
- what are trends in catch and effort.

Strategic Objective # 1: Contribute to the management of fish and their habitat

- monitor catch and effort;
- recommend harvest regulations.

6.0 Monitor Angler Use and Catch Plan

	TASKS	BUDGET CODE	ACTIVITIES/ REQUIREMENTS	STATUS	PRIORITY
6.1	Survey of angler preferences and patterns.	Pl	Review historic angler use patterns.	Required	H
6.2	Obtain angler use and catch data.	Ev	Develop and implement angler use and catch monitoring programs.	Required	H
6.3	Obtain angler use and catch data.	Pl &Ev	Develop monitoring plan for Williston using site specific locations as index.	Required	

7. ISSUE: GLOBAL WARMING

CONCERNS:

- impacts of global warming on fish within the watershed;
- ability to assess any impacts over long period of time.

Strategic Objective # 2: Develop a greater understanding of aquatic ecosystems in northern reservoirs.

- implement a systematic coordinated approach to inventory and assessment of fish and fish habitat.

7.0 Global Warming Plan

	TASKS	BUDGET CODE	ACTIVITIES/ REQUIREMENTS	STATUS	PRIORITY
7.1	Long-term monitoring of water temperatures.	I	Develop water temperature index sites.	Required	
7.2	Review current work.	Pl & I	Investigate research being conducted by others.	Completed	H

8. ISSUE: WATER QUALITY

CONCERNS:

- are there any water quality parameters (e.g. mercury, metals, sedimentation) that affect fish or aquatic life.

Strategic Objective # 1: Contribute to the management of fish and their habitat.

- provide information for the protection of habitat.

8.0 Water Quality Plan

	TASKS	BUDGET CODE	ACTIVITIES/ REQUIREMENTS	STATUS	PRIORITY
8.1	Review existing water quality data as it affects aquatic life.	Pl	Query databases (SEAMS, HYDRONET) to determine impacts on fish.	Required	H
8.2	Collect new data on characteristics that may affect aquatic life.	I	Provide data and interpretations related to aquatic life.		H
8.3	Continue liaison with regulatory agencies.	Pc	Communicate with government agencies.	On-going	

APPENDIX 2

(Prioritised list of tasks)

Prioritised list of tasks.

Priority	Task	Task description
1	3.1.10	Develop Arctic Grayling Action Plan*
2	2.4	Use limnology data to determine Reservoir carrying capacity
3	3.1.8	Grayling – Restore (Meslinka Fertilization)
4	2.3 c	Limnology data collection (long term annual low effort monitor)
5	2.5 b	Develop long-term Williston fish population monitoring strategy
6	5.1	Inform/ educate – students raising kokanee in classroom
7	3.2.2	Kokanee – review and summarise existing data/ perform gap analysis
8	3.5.5	Bull trout – Gething Creek transplant evaluation and develop report
9	2.5 a	Quantify present fish populations in reservoir (Pelagic/ Non-Pelagic)
10	3.5.2	Bull trout – review and summarise existing data/ perform gap analysis
11	3.6.8	Rainbow trout- annual stocking and stocking assessment
12	5.8	Inform/ educate – attend Stakeholder meetings
13	3.9.2	Brook trout - annual stocking and stocking assessments
14	3.5.3	Bull trout- Davis River water temp.
15	3.3.2	Pygmy whitefish- review and summarise existing data/ perform gap analysis
16	6.1	Angler Use/Catch- review historic angler use/ patterns
17	3.6.2	Rainbow - review and summarise existing data/ perform gap analysis
18	3.3.4	Pygmy whitefish- distribution and status
19	3.3.5	Pygmy whitefish- basic biology data
20	2.6	Develop reservoir specific management plans
21	3.8.2	Lake trout - review and summarise existing data/ perform gap analysis
22	3.2.8	Kokanee- produce Action Plan*
23	6.2	Develop and implement angler use/ angler catch, monitoring program
24	8.1	WQ (contaminants) – query data to determine impacts on fish (ie Hg, Metals)
25	3.5.7	Bull trout – produce Action Plan*
26	5.5	Inform/Educate – produce project fact sheets (ongoing)
27	3.6.7	Rainbow trout- develop Action Plan*
28	3.8.7	Lake trout - develop Action Plan*
29	4.3	Data – Communicate/contribute data to provincial database
30	8.2	Review and summarise existing watershed data (ongoing) (i.e. Reports #192, 193)
31	4.1	WQ (contaminants) - Collect new data and input to databases (i.e. SEAM)

***Action Plan-** document specifying activities (locations, timing and methodology) that will be undertaken to benefit the identified species within the context of the Compensation Program's Strategic Plan stated objectives and goals. An "Action Plan" will identify specific activities that will be undertaken or supported by the Compensation Program. An "Action Plan" is not a "Management Plan" as produced by MELP.

APPENDIX 3

(Projected 5 year schedule)

Appendix 3 **Projected 5 Year Schedule**

Priority	Task	Task Description	Current 2000/ 2001	Year 1 2001/ 2002	Year 2 2002/ 2003	Year 3 2003/ 2004	Year 4 2004/ 2005	Year 5 2005/ 2006
		Base costs (vehicles, public consultation, wages, office costs, equipment, etc.)	324,000	330,000	337,000	344,000	351,000	358,000
1	3.1.10	Develop Arctic grayling Action Plan		20,000				
2	2.4	Use limnology data to determine Reservoir carrying capacity	137,000	15,000				
3	3.1.8	Grayling – Restore (Meslinka Fertilization)	77,000	116,000	138,000	140,000	157,000	149,000
4	2.3 c	Limnology data collection (long term annual low effort monitor)		10,000	10,000	10,000	10,000	10,000
5	2.5 b	Develop long-term Williston fish population monitoring strategy	10,000					
6	5.1	Inform/ educate – students raising kokanee in classroom	2,000	2,000	2,000	2,000	2,000	2,000
7	3.2.2	Kokanee – review and summarise existing data/ perform gap analysis				17,000		
8	3.5.5	Bull trout – Gething Creek transplant evaluation and develop report	2,000		2,000			
9	2.5 a	Quantify present fish populations in reservoir (Pelagic/ Non-Pelagic)	104,000				61,000	
10	3.5.2	Bull trout – review and summarise existing data/ perform gap analysis				17,000		
11	3.6.8	Rainbow trout- annual stocking and stocking assessment	54,000	27,000	26,000	26,000	27,000	27,000
12	5.8	Inform/ educate – attend Stakeholder meetings (***completed in "Base Costs Task"***)	(no cost)	(no cost)	(no cost)	(no cost)	(no cost)	(no cost)
13	3.9.2	Brook trout - annual stocking and stocking assessments	7,000	7,000	8,000	8,000	8,000	8,000
14	3.5.3	Bull trout- Davis River water temp.	45,000	45,000	45,000			
15	3.3.2	Pygmy whitefish- review and summarise existing data/ perform gap analysis	12,000	2,000				
16	6.1	Angler Use/Catch- review historic angler use/ patterns						20,000
17	3.6.2	Rainbow - review and summarise existing data/ perform gap analysis						15,000
18	3.3.4	Pygmy whitefish- distribution and status		16,000				
19	3.3.5	Pygmy whitefish- basic biology data	12,000	2,000				
20	2.6	Develop reservoir specific management plans						25,000
21	3.8.2	Lake trout - review and summarise existing data/ perform gap analysis						16,000
22	3.2.8	Kokanee- produce Action Plan						
23	6.2	Develop and implement angler use/ angler catch, monitoring program						
24	8.1	WQ (contaminants) – query data to determine impacts on fish (ie Hg, Metals)						
25	3.5.7	Bull trout – produce Action Plan						
26	5.5	Inform/Educate – produce project fact sheets (***completed in "Base Costs Task"***)	(no cost)	(no cost)	(no cost)	(no cost)	(no cost)	(no cost)
27	3.6.7	Rainbow trout- develop Action Plan						
28	3.8.7	Lake trout - develop Action Plan						
29	4.3	Data – Communicate/contribute data to provincial database						
30	8.2	Review and summarise existing watershed data (ongoing) (i.e. Reports #192, 193)						
31	4.1	WQ (contaminants) - Collect new data and input to databases (i.e. SEAM)	25,000	25,000	25,000	25,000		
ongoing		Dinosaur Reservoir aquatic plant transplant	10,000	15,000	15,000	15,000		
ongoing		Project maintenance	1,000	1,000	1,000	1,000	1,000	1,000
ongoing		report writing (previous years)	3,000	3,000	3,000	3,000	3,000	3,000
new		Williston Reservoir stream mouth access improvements		2,000	2,000			
new		fish utilisation of Mesilinka Embayment		19,000	19,000	20,000	20,000	21,000
new		Fish species of Williston Reservoir CD ROM (Don McPhail)	25,000					
new		Doonan Lake transplant and habitat enhancement		4,000	4,000	2,000	2,000	
Available funds (Year 1 total includes projected $65,000 carry over from 1999)			658,000	605,000	617,000	630,000	642,000	655,000
Sum of tasks			850,000	661,000	637,000	630,000	642,000	655,000
Total			**-192,000**	**-56,000**	**-20,000**	**0**	**0**	**0**